Exercice N° 4 :

1°)

a- I prend sa valeur max

→Résonnance d'intensité

→Circuit résistif

$\rightarrow Z_1 + r_0 + R + 20 + 10 = 30\ \Omega$

b- $\omega_1 = \omega_0 = \dfrac{1}{\sqrt{LC}} = \dfrac{1}{\sqrt{4.10^{-2}.16.10^{-6}}} = 1250 rad.s^{-1}$

$U = Z_1 I_1 \Rightarrow I_1 = \dfrac{U}{Z_1} = \dfrac{12}{30} = 0,4A$

$I_{max} = I,\sqrt{2} = 0,4\sqrt{2}\ A$

c- Facteur de sur tension

$Q = \dfrac{U_C}{U} = \dfrac{Z_C.I}{Z.I} = \dfrac{1}{C\omega_0.(R+r)} = \dfrac{L\omega_0}{(R+r)}$

$Q = \dfrac{1}{16.10^{-6} \times 1250 \times 30} = 1,66$

$Q = \dfrac{U_C}{U} > 1 \quad \rightarrow \quad u_c > u \rightarrow$ sur tension

d- $u_c(t) = U_{cm} \sin(\omega t + \varphi_{uc})$

$U_{Cm} = Z_C I_m = \dfrac{I_m}{C\omega} = \dfrac{0,4\sqrt{2}}{16.10^{-6} \times 1250} = 28,28V$

$\varphi_u = \varphi_i = 0$ (en phase)

Or $u_c = \dfrac{q}{C} = \dfrac{1}{C} \int i.dt$ avec $\varphi_{u_C} = \varphi_i - \dfrac{\pi}{2}$

$u_c(t) = 28,28 \sin(1250t - \dfrac{\pi}{2})$ en V

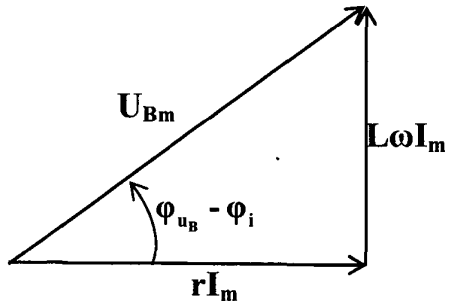
$u_B(t) = U_{Bm} \sin(\omega t + \varphi_{uB})$

$U_{Bm} = Z_B I_m$

$U_{Bm} = \sqrt{r^2 + (L\omega)^2}.I_m = \sqrt{10^2 + (0,041 \times 1250)^2}.0,4$

$U_{Bm} = 28,84V$

$u_B = L\dfrac{di}{dt} + ri$



$tg(\varphi_{u_B} - \varphi_i) = \dfrac{L\omega}{r} = \dfrac{0,04 \times 1250}{10} = 5 \Rightarrow \varphi_{u_B} - \varphi_i = 1,37 rad$

$u_B(t) = 28,84 \sin(1250t + 1,37)$ en V.